

REMARKS

Claims 1, 18, 35, 108, 136 are amended, no claims are canceled, and no claims are added; as a result, claims 1-52, 108-126, 136-154 and 252-278 are now pending in this application.

Support for the amendment to claims 1, 108, and 136 can be found in the specification generally. Moreover, specific examples of support are found at page 14, lines 1-16, and in Figure 3. No new matter is believed proposed by way of amendment.

Support for the amendment to claim 18 can be found in the specification generally. Moreover, specific examples of support are found at page 14, lines 1-16, and in Figure 3. No new matter is believed proposed by way of amendment.

Support for the amendment to claim 35 can be found in the specification generally. Moreover, specific examples of support are found at page 14 and in Figure 3. No new matter is believed proposed by way of amendment.

Claim Objections

Claims 271, 275 and 276 were objected to for unclear claim language. Applicant respectfully traverses. Claims 271, 275 and 276 recite, in part, “at a solder reflow temperature.” This claim language provides a definition of the temperature in the claim as would readily be understood by one of skill in the art. Applicant requests withdrawal of this claim objection.

§102 Rejection of the Claims

Claims 1, 2, 9, 11-13, 108, 118 and 120-122 were rejected under 35 U.S.C. § 102(b) for anticipation by Yamamoto et al. Applicant respectfully traverses.

Claim 1, as amended, recites, among other things, “a material having a Young's modulus of greater than 3 megapascals and a peeling stress of less than 13 megapascals, at a solder reflow temperature, attaching the die to the substrate. Applicant can not find these features in Yamamoto. Accordingly, Applicant submits that claim 1 and its dependent claims 2-17 are allowable over Yamamoto.

Claim 108 as amended recites, among other things, “a material having a Young's modulus of between about .1 megapascals and less than 3 megapascals, at a solder reflow temperature of between 200 to 280 °C, attaching the die to the substrate, the material including a peeling stress of less than 17 megapascals. Applicant can not find these features in Yamamoto. Accordingly, applicant submits that claim 108 and its dependent claims 109-126 are allowable over Yamamoto.

§103 Rejection of the Claims

Claims 1, 2, 9, 11, 12, 13, 108, 118 and 120-122 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamamoto et al. (U.S. 6,265,782) in view of Taguchi et al. (U.S. Patent 6,429,372). Claims 3-6 and 110-114 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamamoto et al. and Taguchi et al. as applied to claims 1 and 108 respectively above, and further in view of Yew et al. (U.S. Patent 6,049,129) and Yamagata (U.S. Patent 5,552,637). Claims 7, 8, 10, 14, 15, 115-117, 119, 123 and 124 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamamoto et al. and Taguchi et al. as applied to claims 1 and 108 respectively above, and further in view of Oxman et al. (U.S. Patent 6,395,124). Claims 16 and 125 were rejected under 35 U.S.C. § 103(a) as being unpatentable over and in view of Yamamoto et al. and Taguchi et al. as applied to claims 1 and 108 respectively above, and further in view of Penry (U.S. Patent 6,049,094). Applicant respectfully traverses.

Applicant submits that independent claims 1 and 108 are allowable over Yamamoto in view of Taguchi for at least the reasons stated above. Taguchi does not cure the defects in Yamamoto as a reference against claim 1 or claim 108. Allowance of claims 1 and 108 is requested.

The Office Action states that “determination of parameters and respective values/ranges such as YM, hardness, viscosity . . . of various die attach material/encapsulant and respective composition/formulation in chip packaging/encapsulation technology art is a subject of routine experimentation and optimization to achieve the desired thermal, mechanical and electrical properties for the IC package.” Office Action at page 6. Applicant respectfully traverses the assertion that all materials and composition in packaging arts are merely routine

experimentation. This is evidenced by the numerous patents issued by the USPTO in the packaging arts. No *prima facie* case of obviousness has been established.

Claims 2-17 depend from claim 1 and are allowable over Yamamoto combined with Taguchi, and variously with Yamagata, Oxman, or Penry for at least substantially similar reasons as stated above with regard to claim 1. Moreover, these claims recite various features that patentable distinguish these claims over the applied references. For ease of examination applicant does not argue these features at this time and incorporates all prior responses by reference to preserve issues for appeal.

Claims 109-126 depend from claim 108 and are allowable over Yamamoto combined with Taguchi, and variously with Yamagata, Oxman, or Penry for at least substantially similar reasons as stated above with regard to claim 108. Moreover, these claims recite various features that patentable distinguish these claims over the applied references. For ease of examination Applicant does not argue these features at this time and incorporates all prior responses by reference to preserve issues for appeal.

Claims 35, 26, 44, 46-48, 52, 136, 146, 148-150 and 154 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamamoto et al. in view of Narita (U.S. Patent 6,144,107). Applicant respectfully traverses.

Claim 35 as amended recites, among other things, “a rigid die attach material attaching the die to the substrate and having has a Young’s modulus of over 0.1 megapascals at a solder reflow temperature of between 200 to 280 °C and a peeling stress of less than 17 megapascals.” Applicant can not find these features in Yamamoto, Taguchi, or Narita either alone or in combination. Accordingly, Applicant submits that claim 35 and its dependent claims 36-52 are allowable over the applied documents.

Further, Yamamoto teaches materials with elasticity of from 3 to 50 MPa, and outstanding Office Action admits that Yamamoto does not teach the die attach material being rigid. The Narita reference teaches that the die attach material is soft and flexible with a hardness of less than 30, and attaches the die 3 to the thin lead terminals 1. Neither teaches or suggests a rigid substrate or a rigid die attach material. Thus independent claim 35 has features that are not found in either of the suggested references. Further, even if the claimed combination

of references were to be found in one or the other of the suggested references, there is no suggestion in either reference to direct one of ordinary skill to combine an *optical transparent* package of Narita with the double coated adhesive film of Yamamoto.

Claim 136 as amended recites, in part, “a rigid die attach material attaching the die to the substrate, wherein the rigid die attach material includes a Young’s modulus of greater than 4 megapascals and a peeling stress of less than 12 megapascals. Applicant can not find these features in Yamamoto or Narita, either alone or in combination. The Office Action admits that Yamamoto does not teach the die attach material being rigid. The Narita reference teaches that the die attach material is soft and flexible with a hardness of less than 30, and attaches the die 3 to the thin lead terminals 1. Neither Yamamoto nor Narita teach or suggest a rigid substrate or a rigid die attach material. Neither Yamamoto nor Narita teach or suggest a Young’s modulus of greater than 4 megapascals and a peeling stress of less than 12 megapascals. Thus independent claim 136 has features that are not found in either of the suggested references. Further, even if the claimed combination of references were to be found in one or the other of the suggested references, there is no suggestion in either reference to direct one of ordinary skill to combine an *optical transparent* package of Narita with the double coated adhesive film of Yamamoto. Accordingly, Applicant submits that claim 136 and its dependent claims 137-154 are allowable over Yamamoto and Narita.

Claims 17 and 126 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamamoto et al. and Taguchi et al. as applied to claims 1 and 108 respectively above, and further in view of Narita. Applicant respectfully traverses. Claims 17 and 126 are allowable with their parent claims 1 and 108. Allowance of claims 17 and 126 is requested.

- Claims 18, 26, 28-30, 252, 260, 261, 263 and 277 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Yew et al. in view of Yamamoto et al., Taguchi et al. and Satsu et al. (U.S. Patent 6,225,418). Applicant respectfully traverses.

Claim 18 as amended recites, in part, “a material having a coefficient of thermal expansion α_2 of less than about 400 (four-hundred) ppm/ $^{\circ}$ C attaching the die to the substrate, wherein the material has a Young’s modulus of greater than 4 megapascals, at a solder reflow

temperature of between 200 to 280 °C. a peeling stress of less than 13 megapascals, and a maximum strain of less than 0.1. Applicant can not find these features in Yamamoto, Taguchi, or Satsu, either alone or in combination. Accordingly, Applicant submits that claim 18 and its dependent claims 19-34 are allowable over the applied documents.

Claim 252 recites, among other things, “a material having a coefficient of thermal expansion α_2 of between about one and about sixty-two ppm/°C attaching the die to the substrate, wherein the material has a Young’s modulus of between .1 megapascals and less than 3 megapascals ...”, which is not found in the suggested combination of references. The outstanding Office Action suggests that the Yew or Yamamoto teach the recited ranges. Applicant submits that the cited section of Yew discloses a material with a modulus of 1300 MPa, which is not in the recited range, and Yamamoto has been shown above to teach away from the claim. The cited references of Taguchi and Satsu do nothing to cure the above noted failure of the Yew and Yamamoto references to describe or suggest the above noted claim features.

Claim 261 recites, among other things, “a material having a coefficient of thermal expansion α_2 of between about 151 (one-hundred and fifty-one) and about 400 (four-hundred) ppm/°C attaching the die to the substrate, wherein the material has a Young’s modulus of between .1 megapascals and less than 3 megapascals, at a solder reflow temperature of between 200 to 280 °C.”

Claim 109 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamamoto et al. and Taguchi et al. as applied to claim 108 and further in view of Kunitomo et al. (U.S. Patent 5,550,408). Applicant respectfully traverses and submits that claim 109 is allowable over the applied references for at least the same reasons as stated above with regard to parent claim 108. Withdrawal of the rejection is requested.

Claims 19 and 253 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Yew et al., Yamamoto et al., Taguchi et al. and Satsu et al. as applied to claims 18 and 252 above, and further in view of Applicants’ Prior Art. Applicant respectfully traverses and submits that claims 19 and 253 are allowable with their parent claims 18 and 252, respectively.

Claims 20-23 and 254-257 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Yew et al., Yamamoto et al., Taguchi et al. and Satsu et al. as applied to claims 18 and 252 above, and further in view of Yamagata. Applicant respectfully traverses and submits that claims 20-23 and 254-257 are allowable with their parent claims 18 and 252, respectively.

Claims 24, 25, 27, 31, 32, 258, 259, 262 and 264-267 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Yew et al., Yamamoto et al., Taguchi et al. and Satsu et al. as applied to claims 18, 252 and 261 above, and further in view of Oxman et al. These are dependent claims that are allowable with their parent claim as Oxman does not cure the defects of Yew, Yamamoto, Taguchi and Satsu are references against the pending claims. Allowance of claims 24, 25, 27, 31, 32, 258, 259, 262 and 264-267 is requested.

Claims 33 and 268 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Yew et al., Yamamoto et al., Taguchi et al. and Satsu et al. as applied to claims 18 and 261 respectively above, and further in view of Penry. Claims 34 and 269 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Yew et al., Yamamoto et al., Taguchi et al. and Satsu et al. as applied to claims 18 and 261 respectively above, and further in view of Narita. Applicant respectfully traverses and submits that claims 33-34, and 268 and 261 are allowable with their parent claims 18 and 261, respectively.

Claims 37-41 and 139-142 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamamoto et al. and Narita as applied to claims 35 and 136 above, and further in view of Yew et al. and Yamagata. Claims 42, 43, 45, 49, 50, 143, 144, 145, 147, 151 and 152 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamamoto et al. and Narita as applied to claims 35 and 136 above, and further in view of Oxman et al. These are dependent claims that are allowable with their parent claims 35 and 136. Allowance of claims 37-41, 139-142, 42, 43, 45, 49, 50, 143, 144, 145, 147, 151 and 152 is requested.

Claims 51 and 153 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamamoto et al. and Narita as applied to claims 35 and 136 above, and further in view of Penry.

Claim 137 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamamoto et al. and Narita as applied to claim 136 above, and further in view of Kunitomo et al. Claim 138 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamamoto et al. and Narita as applied to claim 136 above, and further in view of Applicants' Prior Art. These are dependent claims that are believed to be allowable with their respective parent claims.

Claim 270

Claim 270 was indicated as rejected in the Office Action summary. However, the Office Action does not provide any detailed analysis of a rejection. As claim 270 was indicated as allowable in the Office Action mailed November 17, 2004, Applicant treats claim 270 as now in allowable form. If this is not correct Applicant requests a detailed analysis of claim 270 including the art being used to now reject the claim.

Allowable Subject Matter

Claims 271, 275 and 276 were indicated to be allowable if rewritten or amended to overcome the objections set forth in the Office Action.

AMENDMENT AND RESPONSE UNDER 37 CFR § 1.116 – EXPEDITED PROCEDURE

Serial Number: 09/775,366

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Title: ELECTRONIC DEVICE PACKAGE

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Dkt: 303.706US1

Claim 278 was objected to as being dependent upon a rejected base claim, but were indicated to be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 272-274 were allowed.

CONCLUSION

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney (612) 349-9587 to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

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CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: Mail Stop AF, Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 6 day of February, 2006.

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